Ultrahigh vacuum AFM/STM

(Jeong Young Park et al.)

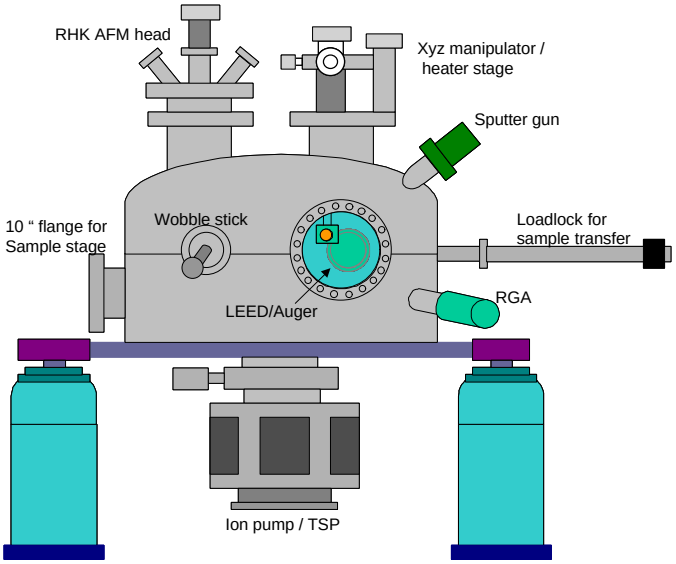

Figure 1. Schematic of UHV AFM/STM

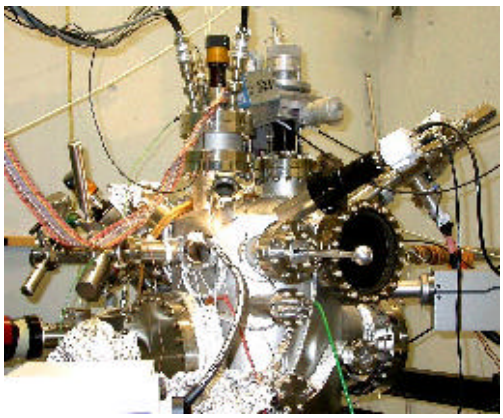

Figure 2. Photograph of UHV AFM/STM

To separate intrinsic tribological properties of the quasicyrstal from that of the oxide layer that is present in air it is crucial to make the sample atomically clean. To that end sample preparation and characterization were performed in a UHV chamber with a base pressure of 1.0 x 10^{-10} torr. Our UHV atomic force microscopy system consist of a commercial RHK UHV-AFM mounted on a 6" flange in a chamber that includes a heating stage by electron beam bombardment, Ar^{+} ion sputtering for sample cleaning, and low energy electron diffraction (LEED)/ Auger electron spectroscopy for surface analysis. Samples and cantilevers can be transferred from air through a load-lock without breaking the vacuum, thus allowing measurements with various cantilevers with different spring constant and metal coating (see Fig. 1and Fig. 2).

By using conductive cantilevers the current between the cantilever and sample could be measured and used for feedback in STM mode, while the bending of the cantilever could be measured simultaneously (Fig. 3 and Fig 4).

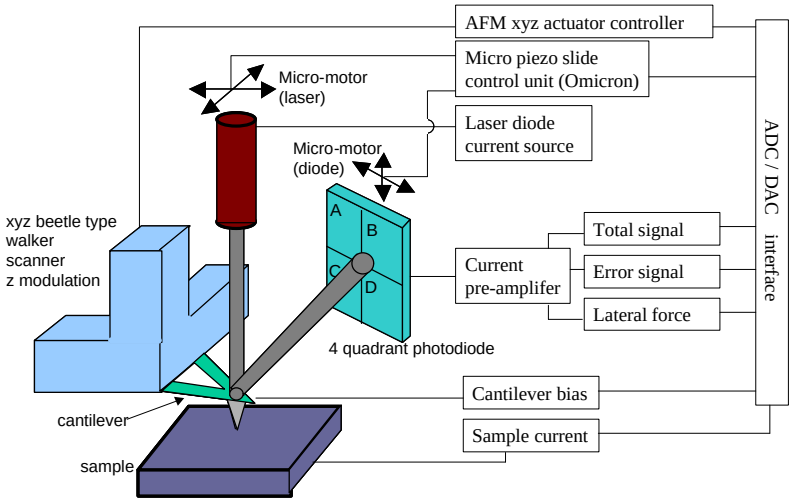

Figure 3. Force and current detection schematics of AFM / STM system

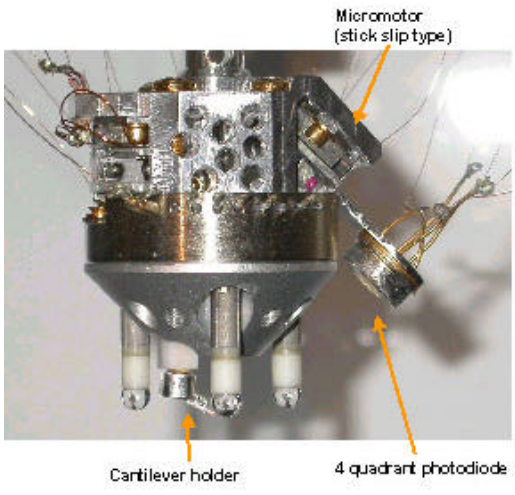

Figure 4. Photograph of UHV AFM head